



Palatability of marine macro-holoplankton: Nematocysts, nutritional quality, and chemistry as defenses against consumers

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Limnol. Oceanogr., 47(5), 2002, 1456-1467 | DOI: 10.4319/lo.2002.47.5.1456

ABSTRACT: Chemical defenses against consumers have been hypothesized to be common among marine macro-holoplankton, but few studies have assessed macro-holoplankton susceptibility to predators or the traits affecting palatability. We used generalist fishes to determine the palatability of fresh tissues, freeze-dried homogenates, and chemical extracts from 19 species of macro-holoplankton. Fishes rejected fresh tissues of all the cnidarians, ctenophores, and cyanobacteria we examined but consumed salp and chaetognath tissues. In contrast, fishes consumed homogenates and chemical extracts of all macro-holoplankton except for the cyanobacterium *Trichodesmium* sp. We examined nematocysts and low nutritional quality as mechanisms causing rejection of fresh tissues. Once nematocysts were deactivated, fishes consumed cnidarian tentacles, indicating that nematocysts served as defenses. The nutritional quality of macro-holoplankton varied almost 500-fold among species and was strongly bimodal, with most macroholoplankton species having ≤ 0.7 mg soluble protein ml⁻¹ or ≥ 7 mg ml⁻¹. In laboratory assays, there was a significant positive relationship between the nutritional quality of artificial foods and their acceptability to fishes. In field assays, reef fishes avoided experimental foods that had a protein content similar to low-quality macroholoplankton but fed rapidly on higher quality foods. Furthermore, macro-holoplankton that were high in protein content possessed defensive traits that low-protein species lacked. Although fresh tissues of most macro-holoplankton were rejected by generalist fishes, we found evidence of chemical defense only in a cyanobacterium. Thus, chemical defenses were rare among macro-holoplankton, and rejection for >90% of the species we assessed was due to nematocysts or low nutritional quality.

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